Institutional Status Review
580/Information Systems Center

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Agenda

- **Technology Highlights**
- **Good News**
  - Awards
- **Institutional Status**
  - External Outreach
  - Personnel
  - ISO/CMMI
  - Procurement
  - Papers, Conferences, and Seminars
  - Top Issues
- **Special Presentation**
  - Out-Briefing of On-Orbit Missions for Shutdown Review
    - Pat Crouse/Associate Branch Head/Code 581

ISC Technology Highlights

➢ Code 581/Systems Integration and Engineering Branch

- Software Optimization and Reuse Technology (SORT) Project
  - The MOU between NASA and the West Virginia High Technology Consortium (WVHTC) Foundation has had a no cost extension until December 31, 2001
  - The first pilot project, Spacecraft Trending, has been completed
  - The second pilot project, setting goals for the Goddard Mission Services Evolution Center (GMSEC), has been initiated

- Bowie Satellite Operations Control Center (BSOCC)
  - Grants and other agreements are being finalized to transfer operation of the Wide Field Infrared Explorer (WIRE) Test Bed Project to the BSOCC

ISC Technology Highlights

➢ Code 582/Flight Software Branch

- NGST use of Rational Unified Process (Web-enabled end-to-end software engineering process that manages the FSW development process) Rational Real-time (autocode generation tool based upon state diagram and graphic data entry) is proving to be very effective
  - Current plan is for all NGST FSW development organizations to use these tools
  - FSW specific training for other organizations is in development
- The SECCHI science instrument for STEREO (APL mission) is using the Triana C&DH flight code as the baseline architecture for their instrument FSW
  - Code shared with Triana contractors that are developing the flight software for the SECCHI instrument at NRL
  - Adds to the list of external development groups using the GSFC FSW architecture

ISC Technology Highlights

➢ Code 584/Real-Time Software Engineering Branch

- Patent application being submitted for 584W product, SAFS (Standard Autonomous File Server)
  - Completed analyses on competing technologies found by the patent office
- Dwayne Morgan secured two sounding rocket flights of opportunity for flight modem to demonstrate GPS positional data relays at high altitudes back to the WFF
  - The first flight is scheduled to launch from the WFF in February 2002 onboard a 6" outside diameter composite rocket and fly to an altitude of 152Km
  - The second flight is scheduled to launch from Fairbanks, AK, or White Sands, NM in April 2002 and will use a 17.25" diameter rocket and fly to an altitude of 125Km

ISC Technology Highlights

➢ Code 586/Science Data Systems Branch

- Near Archive Data Mining prototype tool was successfully demonstrated to Code 902
  - Area separate from DAACs
  - Goal is to decrease size of data retrieved
  - Trial run for mining tools
- Developed a sensor web architecture concept for the ESTO study titled “An Architecture and Technology Gap Analysis Study for Improved Weather Predictive Capability”
  - An overview presentation to Ed Torres (ESTO) is scheduled for early October
- Continued to support Storage Area Network (SAN) Study Team - Focusing on developing a GSFC-wide prototype to evaluate usefulness and cost-effectiveness for the Center

ISC Technology Highlights

➢ Code 586/Science Data Systems Branch (Continued)

- Completed the implementation and testing of the Hydrogen, Oxygen, and Background (HOB) algorithm for LENA instrument on IMAGE
  - The algorithm was delivered, on schedule, September 4, 2001
  - Used to infer the composition of neutral atoms entering the instrument (characterize physical processes in the ionosphere, magnetosphere and heliosphere)

- Completed Level 1 MODIS reprocessing for the period March to May 2001, per MODIS team direction

ISC Technology Highlights

➢ Code 588/Advanced Architectures & Automation Branch

- Real-time Evaluation and Analysis of Consolidated Health (REACH)
  - Completed prototype Build 2 which contains a prototype health modeling system for spacecraft and allows for full filtering and sorting on constellation visualizations – designed for multi-spacecraft missions to enable consolidated operations
- Scientist's Expert Assistant Simulation Facility (SEA Sim)
  - Completed prototype release 5 which added support for the spectroscopy visualization
- Goal Oriented Commanding
  - Completed phase one prototype system for ESDIS -This prototype system will assist in automating SSR management for Terra

ISC Technology Highlights

➢ Code 588 (Continued)

- The following projects were cancelled at the end of September due to FY02 shortfall
  - Advanced Spacecraft Trend Analysis System (ASTAT)
  - Agents
  - Virtual Mission Operations Center Collaborative Environment (VMOC-CE)
  - Real-time Evaluation and Analysis of Consolidated Health (REACH)
  - Onboard Studies
  - Operating Missions as Nodes on the Internet (OMNI)
  - Scientist's Expert Assistant (SEA)
  - Intelligent Service Validation Agent (ISVA)
  - Java Application Shell (JAS)

ISC Good News

➢ Awards - ISC Excellence Awards

– Engineering Excellence

- Vickie Moran/581-in recognition of exceptional leadership and technical expertise as the TRMM and ERBS Mission Director

- Art Ferrer/582-in recognition of leadership and outstanding technical expertise in support to Aqua I&T, MAP & EO-1 flight software, and the RTEMS open source real-time OS

– Contractor

- Gary Smith/Litton Industries-in recognition for contractor excellence in recovering the EO-1 flight software and enabling EO-1 mission success

ISC Good News

➢ ISC PIP Presentations

– Level I

- Tina Tsui/585 “Development of MyExperts Directory” completed on August 22, 2001

– Level II

- Priscilla Bowes/585 "Secure Single Sign-on for ISC Web Applications” completed on August 25, 2001

- Joycelyn Ingram/587, “Updating the Database and Web Site for the Scientific Visualization Studio”, completed on August 28, 2001

ISC Institutional Status

➢ External Outreach

- Code 584/Real-Time Software Engineering Branch
  - Hosted a meeting with 5 professors from University of Kansas looking for collaboration opportunities
    - Five graduate students will work on an ASIST-related project, for the semester, developing a web-based event log searcher
  - Wallops personnel hosted a group of students on "Take Our Daughters To Work Day"
    - The group prepared an experiment that could be sent up in the space shuttle consisting of wildflowers put in tubes and labeled with the name and address of each student on the different vials
      - » An opportunity has arisen that will allow that experiment to fly on the next shuttle! Sandy Kleckner has been acting as a liaison between Code 870W and the Federal Women's Program as well as making the module logo, writing press releases and keeping everyone informed (via email and the web): http://www.wff.nasa.gov/~FWP/news/todtwd2001/ontheshuttle.html

ISC Institutional Status

➢ External Outreach

- Code 584 (Continued)
  - Dwayne Morgan served as the small business innovative research (SBIR) Phase I Technical Evaluator for the TOPIC E1.03 - In Situ Terrestrial Sensors
    - Proposal targets ocean buoy deployments in the Artic using the Iridium Satellite Network
  - Dan Mandl presented “Taking the Terror Out of a Talk” to the SHARP students on August 2, 2001

- Code 586/Science Data Systems Branch
  - Three students from Worcester Polytechnic Institute will develop a parallelized science data processing tool using a Beowulf cluster
  - Kevin Hartnett supplied images of the Milky Way at the request of Code 460 to be incorporated in middle school educational materials produced on the Sun/Earth Connection

ISC Institutional Status

➢ Personnel

- New Hires/Conversions
  - Elan Williams/580/COE in the Center office on August 27, 2001
  - Dan Smith/581/NASA Excepted Hire (NEX) on September 10, 2001
  - Ronald Zellar /582/Associate Branch Head August 20, 2001 – Ron was a contractor for NRL working GN&C FSW for the FAME Mission, current plan is to have him focus primarily on selected science instrument FSW activities
  - Manuel Buenfil/586/Fresh-Out performing data compression work in Code 690
  - Beth Weinstein/586/Fresh-Out assisting in the development of data pools and EOSDIS Clearinghouse under ESDIS

ISC Institutional Status

- **Personnel (Continued)**
  - Open Positions
    - 581 - Ground Systems and Operations Senior Engineer
    - 582 - Flight Software Expert, 2 Senior Flight Software Engineers, 2 Experienced Terms, 2 Fresh Outs
    - 583 - Planning & Scheduling Expert
    - 586 - Large Data Systems Expert
    - 587 - Branch Head, Science Information Systems Expert, 1 Fresh Out
    - 588 - IS Technology Expert, 1 Fresh Out
    - FY02 Fresh Out Planning
  - Transfers within GSFC
    - Medora Macie/586 transferred from Code 931 and is assigned to the Goddard DAAC in the EOSDIS Science Operations Office
    - Vicki Oxenham transferred to Code 500
  - GSFC Departures
    - Earl Gernatt/586 retired on September 3, 2001

ISC Institutional Status

➢ 01 Personnel Summary to Date

- FY01 Personnel Losses:
  - Outside GSFC: 17 Within GSFC: 7
- FY01 Gains
  - Hire Actions Completed: 24
  - Hire Actions in Progress: 12
  - Hire Names Identified: 0
  - Total: 37

Current FTE Status: 307

FTE Targets - FY01: 299 FY02: 304 FY 03: 289

ISC Institutional Status

➢ ISO 9000 QMS & CMMI

- Michael Stark/Code 581 attended CMMI training September 19–21, 2001
- Sally Godfrey/Code 583 and members of the Goddard Engineering Process Group (EPG) continued training efforts on the Capability Maturity Model Integrated (CMMI) staged model
- The Software Engineering Institute conducted half day and 3-day classes at Goddard for the EPG and other appropriate personnel on the CMMI overview
- The GSFC Software Development Process Improvement Plan has been reviewed by the Management Oversight Group and is being submitted to the Center Director for signature - It will then be forwarded through the Software Working Group to Code AE for review

ISC Institutional Status

➢ Procurement

- Code 586/Science Data Systems Branch
  - Robert Schweiss - Draft RFP was released to Industry August 3, 2001 - Participated in industry comment sessions and requirements traceability exercises

ISC Institutional Status

- **Papers, Conferences, and Seminars**
  - Code 581/Systems Integrations and Engineering Branch
    - The 26th NASA Software Engineering Conference scheduled for November 27–29, 2001 at GSFC has been cancelled
    - Margaret Caulfield attended the Excellence in Government 2001 conference in Washington, DC August 1–3, 2001
    - Pat Crouse attended the AIAA Small Satellite conference in Logan, Utah August 12–15, 2001
  - Code 584/Real-Time Software Engineering Branch
    - Demonstrated ASIST command and control systems, the DTAS trending and analysis system and the SERS emergency response system at the MIDEX proposers conference at the University of Maryland in August
    - John Donohue and Barbara Pfarr/584 attended the ESTO Earth Sciences Technology Conference at University of Maryland in August
    - Several branch members of have been selected for committees to participate in the design and implementation of Goddard's First Career Development Forum

ISC Institutional Status

➢ Papers, Conferences, and Seminars(Continued)

– Code 586/Science Data Systems Branch

- Elizabeth Brinker participated in the CCSDS XML Workshop held in August 2001, where use of the XML standard as a data interchange tool at GSFC was explored with individuals already applying the standard here at GSFC and in other facilities
- Kevin Hartnett participated in a number of HST Project Reviews during the months of July and August with the CSOC contractor reference the transition from the PACOR II level-0 science data processor to the new PACOR A system - Successful transition to the new system began August 7, 2001

ISC Institutional Status

➢ Papers, Conferences, and Seminars

– Code 586 (Continued)

- David Han presented the status of the CDF-to-XDF interface work at the XML workshop that was hosted by the Consultative Committee for Space Data Systems (CCSDS) Panel 2 which was held at Raytheon's Headquarters in Lanham, MD August 20-24, 2001
- Robin Pfister co-authored "ECHO Rediscovers and Responds to NASA's Earth Science User Community", presented at the Human Computer Interaction International 2001 Conference on August 5-10, 2001 in New Orleans, LA
- Robin Pfister co-authored "Content-Based Metadata System: A Workbench to Prototype Data Mining Concepts" at the ESTO Conference at the University of Maryland, August 28-30, 2001

ISC Top Issues

- **Code 582/Flight Software Branch**
  - Triana Systems Test is moving terribly slow – due to a variety of delays
    - FSW Status Review is planned for early November to acquire summary of FSW situation before shutdown and a projection of work yet to be done upon restart
  - Swift BAT FSW funds have been cut
    - Like to add a Civil Servant to backfill
    - Big schedule and quality risks-watching closely

- **Code 586/Science Data Systems Branch**
  - Need to ensure EDOS is ready to provide L0 processing for multiple missions

On-Orbit Mission Shutdown Status

AGENDA

- Earth Science Mission Operations
  - Upper Atmosphere Research Satellite (UARS)
  - Earth Radiation Budget Satellite (ERBS)
- Space Science Mission Operations
  - Sun-Earth Connection Senior Review
  - Mission Operations and Data Analysis Guidance
  - Individual Mission Response

Earth Radiation Budget Satellite (ERBS)

Mission Director: Vickie Moran

Launch Date: October 5, 1984 on Space Shuttle Challenger (STS-13 (41-G))

Enterprise Guidance:

Provide 6-month mission data overlap with SAGE III scheduled for launch 12/2001

Mission Response:

- Developing End of Life Plan
- Controlled reentry is not possible
- Two calibration maneuvers are desired (ERBE and SAGE)
- ERBE maneuver is considered high risk and power constrained to June or December
- Need balance between "depleting energy sources" and performing maneuver

Earth Sciences

Upper Atmosphere Research Satellite (UARS)

Mission Director: Bill Guit

Launch Date: September 12, 199 1 on Space Shuttle Discovery (STS-48)

Enterprise Guidance: Terminate mission (but don't do anything irreversible)

Mission Response:

- Developing End of Life Plan
- Controlled reentry is not possible
- Current debris analysis results in 47.2 square meters -- 1 in 1500 (standard is 1 in 10,000)
- Two Activities currently being pursued
  - Decommission
    - Need to select target orbit at fuel depletion (GN&C supporting currently)
    - Deplete energy sources, render s/c inert
  - Science Traceability
    - Store s/c on orbit

Earth Sciences

UARS Instruments	ESA Envisat-1 (11/01)	SAGE III (12/01)	TIMED (12/01)	EOS Aqua (1/02)	Japanese ADEOS II (2/02)	SORCE (7/02)	CSA SCISAT-1 (1/03)	EOS Aura (7/03)
HALOE	1, 2	1	1, 4	1	1		1	1
SOLSTICE			3			3		
HRDI			1, 4					
MLS	1				1			1
ACRIM						3		
SUSIM			3			3		
WINDII			4					
PEM			4					

1 - Atmospheric chemical species (climate and ozone)

2 - Atmospheric aerosols (climate and ozone)

3 - Solar Irradiance (climate and ozone)

4 - Sun-Earth connection (Code S)

Sun Earth Connection Senior Review

Bi-annual Review to rank science programs within the Sun Earth Connection thrust area within Space Science Enterprise

Panel report is combined with Code S budget to provide guidance for FY02-FY05

14 satellite programs -- 11 have ties to GSFC

3 Data Centers including the Central Data Handling Facility (CDHF) at GSFC

Mission Operations and Data Analysis Guidance

Mission	POP 01-1 Mission Operations Funding Request ($K)	Impact	Mission Operations Revised Funding Target ($K)	Senior Review Recommended Funding Termination
IMP-8	779	70	Nov-01	Mission termination
Wind	1,403	350	Jan-02	Re-define mission
SAMPEX	522	150	Sep-02	Extend unattended ops
FAST	681	500	Sep-03	Transfer all ops to UCB
TRACE	1,070	800	Sep-04	None
IMAGE	740	740	>FY05	None
SOHO	5,469	5,000	>FY05	Contract restructure
ACE	2,293	1,700	>FY05	Reduce sustaining eng.
Polar	1,894	1,670	>FY05	Reduce sustaining, Increase automation

Space Sciences

Global Geospace Science (GGS)
Wind, Polar

Mission Director: Bob Dutilly

Launch Dates: Wind -- November, 1994; Polar -- February, 1996

Enterprise Guidance:

Wind -- Move to L_1 and be support ACE and SOHO studies

Polar -- Maintain robust science program

Mission Response:

- Wind
  - Select low cost L_1 orbit
  - Accept lower data recovery rate
  - Operations performed on the margin of Polar operations
- Polar
  - Investigate reduction of 24X7 staffing
- CDHF
  - Placed under authority of GGS Program, will be substantially de-scoped

SAMPEX, FAST, TRACE

Mission Director: Patrick Crouse

Launch Dates: SAMPEX -- July, 1992; FAST -- August, 1996; TRACE -- April, 1998

Enterprise Guidance:

SAMPEX -- Terminate operations 9/2002

FAST -- Terminate operations 9/2003

TRACE -- Terminate operations 9/2004

Mission Response:

- Consolidate all mission services in the SMEX MOC
- Cross-train mission team members to be cross-functional as well as multi-mission
- Triana suspension enables return of more experienced personnel to SMEX
- Reduce management overhead, and sustaining engineering support
- SAMPEX -- Significant reductions to $150K led PI to request ops continue thru 9/03
- FAST -- Migrate flight and level zero science data processing to UCB
- TRACE -- Use 02 to consolidate, prepare for further reduction in 03

Interplanetary Monitoring Platform (IMP-8)

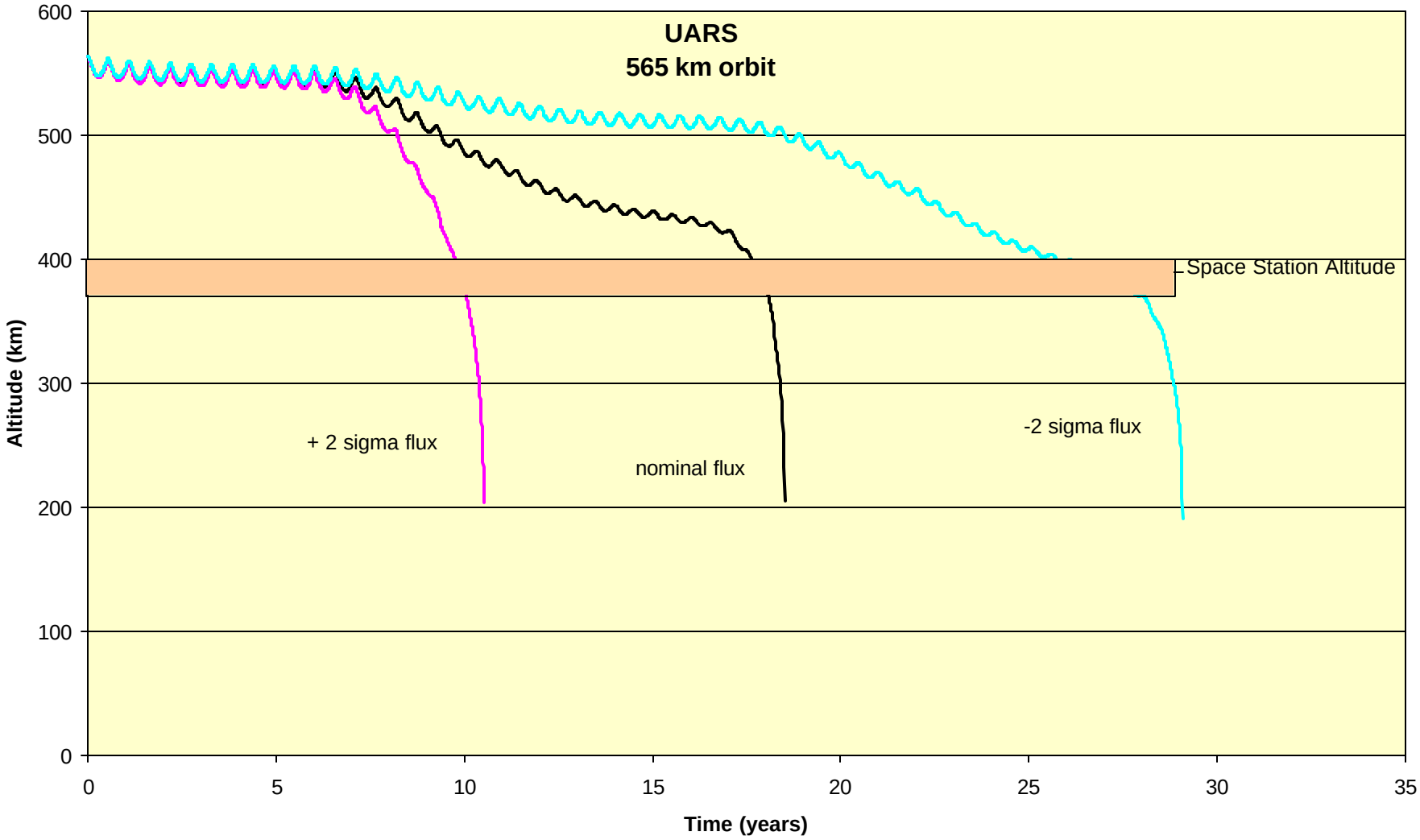
Mission Director: Bob Sodano
Launch Date: October, 1973
Enterprise Guidance: Terminate Mission
Mission Response:

Plan to terminate mission operations by 10/31.

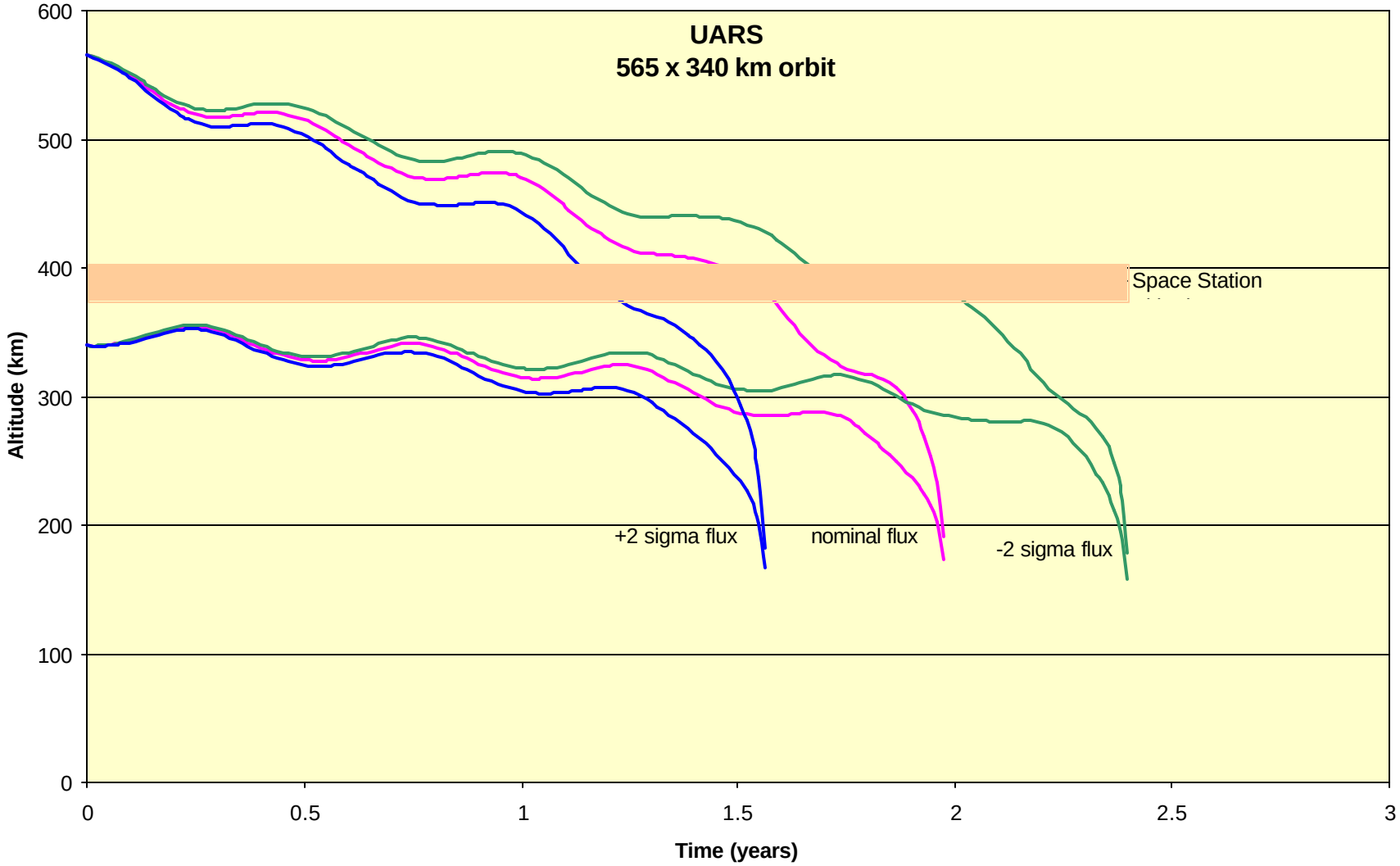
But ...

Supplemental Information

UARS "No-Burn" Decay



Elliptical Orbit Case



Circular Orbit Case